Biocoding Integrated and Customizable Electronic Patient Records

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We can leverage internetworking technologies in health care environments to create a new paradigm for reviewing the critical information required to make decisions efficiently and accurately. Because local and wide area networking allow us to pull together disparate but highly manipulable data from dispersed locations at any point on the network, we can use highly customized client-side applications to automatically assemble and review the vital patient record information most relevant to a health care provider.

A physician's intuition in decision making depends heavily on his understanding of hierarchies of spatially and sequentially related physiological systems. This intuition develops over time, through extensive training and experience; the pieces of this integrated knowledge are based on a series of distinct physiological models. By carefully and extensively researching how health care providers use these models, we can build from them a reference framework for creating unique electronic 'patient files' highly specific to a provider's needs at the point of care.

The point of integration between patient data and reference frameworks is analogous to that used in Geographic Information Systems (GIS). GIS technology provides new views of vital data by mapping proprietary data sets against a geographical reference data framework. This "geocoding" process capitalizes on the spatial nature of many types of data. For data types with a geographic component, geocoding against a framework geographic model allows analysts to perform complex spatial queries across their data. Visualizing query results then give analysts entirely new views of data trends which may be less apparent otherwise.

The geocoding metaphor applies to health care information systems as we can "biocode"--map specific patient record information into a generic physiological model. Biocoding capitalizes on the spatial and temporal nature of patient record information: all events in a medical history have by definition specific physiological locations and systemic involvement (such as the location of a fracture or prescription of drugs); likewise health care events are recorded at specific dates or periods. Biocoding events in a patient's history ties together related events across time and physiology.

We can reuse generic physiological frameworks to create biocoded views of patient record information relevant to a specific health care environment. Using frameworks to guide automatic mining of internetworked databases can ensure that information is retrieved which meets the specific needs of a single or group of health care providers. This information can then be bundled together for review at the point of care, with the most recent or most relevant information "on top," and with related but potentially less immediately relevant information available as well.

There are several advantages to this paradigm. First, at any point where care is given a "patient file" can be created from internetworked data repositories that meets the specific information needs of the providers involved. This eliminates the need to collect, maintain, and retrieve large volumes of physical media locally. Second, relying on customizable frameworks to guide the automated data mining process creates a point-in-time electronic "patient file" wherein the information most important to a provider's decision making process is made highly accessible. Creating frameworks for automation also ensures that the intelligence behind collecting and assembling records at the point of care is that of the provider, not an artificial method which might result in inaccuracies or incompleteness. Additionally, for any patient a provider may deviate from the framework to ensure retrieval of data uniquely vital to a specific case.

Finally, the gathering of disparate information types allows the multi-dimensional views of patient records (across a patient's history or family history, across patients with similar ailments, across an institution or geographic region) that the vision of an integrated electronic patient record brings to mind. As a patient-centered tool, it can also be used to support financial and outcomes information management.

A mock-up of this model will include demonstrations of possible interfaces to electronic patient files and research in physicians' cognitive processes.

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